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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/911,784 | 07/24/2001 | Masaharu Yoshiyama | 1503.65719 | 3902 |
| 7590 05/01/2007 Patrick G. Burns, Esq. GREER, BURNS & CRAIN, LTD. Suite 2500 300 South Wacker Drive Chicago, IL 60606 | | | EXAMINER PHAM, KHANH B | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|-----------------------------------------|--|
| Office Action Summary | Application No. 09/911,784 | Applicant(s) YOSHIYAMA ET AL. | |
| | Examiner Khanh B. Pham | Art Unit 2166 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 8, 2006 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. **Claims 1, 4, 10, 13 and 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Chaudhuri et al. (US 6,223,171 B1), hereinafter "**Chaudhuri '171**", in view of Lohman et al. (US 6,356,889 B1), hereinafter "**Lohman**".

As per claims 1, 4, 10,13, and 16, Chaudhuri '171 teaches a method, a computer readable medium, and apparatus (Col. 2, lines 63-67) for "retrieving data from a database according to retrieval condition set forth in an issued SQL sentence" (Col. 6 lines 22-30) comprising:

- "parsing the issued SQL sentence" at Col. 6 lines 50-55, Col. 23 lines 19-25 and Fig. 6;

(Chaudhuri '171 teaches that the database administrator begins the process by specifying a workload (Col. 23 lines 19-25), wherein the workload comprises a set of SQL queries (Col. 6 lines 50-55) and is parsed (i.e. "breakdown of the query by type") to identify query types as shown in Fig. 6)

- "making a comparison, immediately after parsing the issued SQL sentence, between a cost required when retrieval is performed after an index corresponding to a retrieval condition is generated dynamically and a cost required when retrieval is performed without generating an index dynamically" at Col. 23 lines 39-67 and Fig. 15;

(Chaudhuri '171 teaches the step of comparing costs of the workload (i.e., "retrieval condition") between the

configurations with and without an index on column B and a two-column index (B,A))

- “dynamically generating an index corresponding to the retrieval condition if the cost required when the retrieval is performed without generating an index dynamically is higher as a result of the cost comparison” at Col. 23 line 64 to Col. 24 line 6;

(Chaudhuri '171 teaches the step of building the two-column index (B,A) as a result of the cost comparison.)

- “and dynamically retrieving the data from the database without user interaction, by using the dynamically generated index” at Col. 1 lines 20-35.

(Chaudhuri '171 teaches the indexes are used by the database server to access data in a database.)

The difference between Chaudhuri '171 and the claimed invention is that Chaudhuri '171 does not perform a comparison immediately after parsing the issued SQL sentence **without user interaction** as claimed. However, Lohman teaches a similar method for dynamically generating indexes to enhance performance of database execution (Col. 2 lines 60-67), wherein the index are generated by a query optimizer, without user interaction. Lohman recognizes that “most database systems leave the determination of the appropriate materialization up the user. However, this can be very difficult and/or time consuming for the user” and suggest the use of a cost-based query optimizer to determine whether an index should be generated at

Col. 2 line 60 to Col. 3 line 5. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri '171 with Lohman's teaching so that the index could be generated without user interaction, and therefore improve processing time and accuracy of the system while reducing burden on the user as suggested by Lohman.

As per claim 4, Chaudhuri '171 and Lohman teach the method according to claim 1 as discussed above. Chaudhuri '171 also teaches: "managing data of the number of accesses, a generation date and time, and an update frequency of the dynamically generated index" at Figs. 8-13; and "deleting the dynamically generated index according to management status of the managed data" at Col. 16 lines 35-45.

5. **Claims 3, 8, 12 and 15 rejected under 35 U.S.C. 103(a)** as being unpatentable over **Lohman**, in view of Chaudhuri et al. (US 6,169,983 B1), hereinafter "**Chaudhuri '983**".

As per claims 3, 12, and 15, Lohman teaches a method, a computer readable medium and apparatus for retrieving data from a database according to retrieval conditions set forth in an issued SQL sentence (Col. 4 lines 45-65), comprising:

- "parsing the issued SQL sentence" at Col. 6 lines 45-55 and Fig. 3;
- "making a comparison, immediately after parsing the issued SQL sentence without user interaction, between a cost required when retrieval is performed

after an index corresponding to a retrieval condition is generated dynamically and a cost required when retrieval is performed without generating an index dynamically” at Col. 6 lines 50-65;

- “if the cost required when the retrieval is performed without generating an index dynamically is higher as a result of the cost comparison, dynamically generating an index corresponding to the retrieval condition” at Col.6 line 66 to Col. 7 line 20;
- “retrieving the data from the database by using the dynamically generated index” at Col. 4 line 65 to Col. 5 line 18.

The difference between Lohman and the invention of claims 3, 12, 15 is that Lohman teaches the step of generating a new index but does not teach that the new index is generated by combining two or more indexes as claimed. However, Chaudhuri '983 teaches a similar method for index selection, including the step of: “determining whether or not two or more indexes which satisfy the retrieval condition by being combined exist among a plurality of already generated indexes by combining the two or more indexes” at Col. 14 lines 15-52, and “generating an index corresponding to the retrieval condition by combining the two or more indexes, if the two or more indexes exist” at Col. 14 lines 53-55. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Lohman and Chaudhuri '983's teachings in order to reduce the time required to generate a new index and reduce space requires to store the new index. Generating a new index by combining two or

more existing indexes as taught by Chaudhuri '983 would "help minimize the amount of storage space consumed by the indexes while minimizing any increase in cost of executing queries of the workload against the database using the indexes", as noted by Chaudhuri '983 at Col. 1, lines 45-50.

As per claim 8, Lohman and Chaudhuri '983 teach the method according to claim 3 discussed above. Chaudhuri '983 also teaches the steps of: "managing data of the number of accesses, a generation date and time, and an update frequency of the dynamically generated index" at Col. 13 lines 40-60; and "deleting the dynamically generated index according to management status of the manage data" at Col. 13 lines 40-60.

6. **Claims 2, 6-7, 11, 14 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Lohman, and in view of Smith et al. (US 5,404,510 A), hereinafter "**Smith**".

As per claims 2, 11, 14, Lohman teaches a method, a computer readable medium and apparatus for retrieving data from a database according to retrieval conditions set forth in an issued SQL sentence (Col. 4 lines 45-65), comprising:

- "parsing the issued SQL sentence" at Col. 6 lines 45-65 and Fig. 3;
- "making a comparison, immediately after parsing the issued SQL sentence without user interaction, between a cost required when retrieval is performed

after an index corresponding to a retrieval condition is generated and a cost required when retrieval is performed without an index” at Col. 6 lines 50-65;

- “if the cost required when the entire retrieval is performed is higher as a result of the cost comparison, dynamically generating a second index which satisfies only the retrieval condition” at Col. 6 line 66 to Col. 7 line 18;
- “and retrieving a database by using the dynamically generated second index” at Col. 4 line 65 to Col. 5 line 18.

The difference between Lohman and the invention of claims 2, 11, 14 is that Lohman does not teach that the new index is generated by using the first index, if the first index which satisfies the wider condition exists. However, Smith teaches a similar method for index selection, including the steps of: “determining whether or not a first index which satisfies a condition wider than the retrieval condition exists among already generated indexes” and “generating a second index which satisfied only the retrieval condition by using the first index, if the first index which satisfies the wider condition exists” at Col. 12 lines 32-65. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Lohman and Smith’s teachings in order to reduce the time requires to generate a new index. Generating a new index from an existing wider index requires less time because it deals with only a subset of the data in the existing index, instead of the entire set of data in the database. Combining Smith’s teaching with Lohman method would therefore significantly reduce the time required to generate a new index.

As per claim 6, Lohman and Smith teach the method according to claim 2 discussed above. Smith also teaches: “managing data of the number of accesses, a generation date and time, and an update frequency of the dynamically generated index” at Col. 11 lines 25-65; and “deleting the dynamically generated index according to management status of the managed data” at Col. 6 lines 42-43. Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Lohman and Smith’s teachings to improve performance of the system. Adding the steps as taught by Smith to Lohman system would allow the system to identify and remove high cost indexes which are expensive to maintain, therefore improve the performance of the system.

As per claim 7, Lohman and Smith teach the database retrieving method according to claim 2 as discussed above. Smith further teaches:

- “determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a date update or deletion” at Col. 6 lines 22-33;
- “determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists” at Col. 6 lines 22-33;
- “and deleting the index prior to start of the access process, if the access performance is degraded” at Col. 6 lines 42-43.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Lohman and Smith's teachings to improve performance of the system. Adding the steps as taught by Smith to Lohman system would allow the system to identify and remove high cost indexes which are expensive to maintain, therefore improve the performance of the system.

7. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over Chaudhuri '171 and Lohman as applied to claim 1 above, and further in view of Smith.

As per claim 5, Chaudhuri '171 and Lohman teaches the database retrieving method according to claim 1 as discussed above. Chaudhuri '171 and Lohman do not explicitly teaches the limitations of claim 5. However, Smith teaches:

- "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a data update or deletion" at Col. 6 lines 22-33 ;
- "determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists" at Col. 6 lines 22-23;
- "and deleting the index prior to start of the access process, if the access performance is degraded" at Col. 6 lines 42-43 .

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Chaudhuri '171, Lohman and Smith's teachings to

improve performance of the system. Adding the steps as taught by Smith to Chaudhuri '171 and Lohman's system would allow the system to identify and remove high cost indexes which are expensive to maintain, therefore improve the performance of the system.

8. **Claims 9 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Lohman and Chaudhuri '983 as applied to claims 3, 8, 13, and 15 above, and further in view of **Smith**.

As per claim 9, Lohman and Chaudhuri '983 teach the database retrieving method according to claim 3 as discussed above. Lohman and Chaudhuri '983 do not explicitly teach the steps of: "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a data update or deletion; determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists; and deleting the index prior to start of the access process, if the access performance is degraded".

However, Smith teaches a similar method including the step of:

- "determining whether or not an already generated index that is applicable to an access process exists, if an access to the database is a date update or deletion" at Col. 6 lines 22-33;
- "determining whether or not access performance of the access process is degraded due to existence of the index, if the index exists" at Col. 6 lines 22-33;

- “and deleting the index prior to start of the access process, if the access performance is degraded” at Col. 6 lines 42-43.

Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Lohman and Chaudhuri '983's teachings with Smith's teaching so that “unimportant and volatile indexes may be pruned from the system” (Smith, Col. 6 lines 40-45), and therefore improve the performance of the database by reducing the cost of maintenance these indexes.

Response to Arguments

9. Applicant's arguments filed December 8, 2006 have been fully considered but they are not persuasive. The examiner respectfully traverses applicant's arguments.

In response to applicant's argument that neither Chaudhuri '171 nor Lohman teach the step of “dynamically retrieving the data from the database without user interaction by using the dynamically generated index”, the examiner respectfully submits that in any database system, the step of using indexes to retrieve data from the database is strictly performed by the database system, without any user interaction. After submitting a query, the user just waits for the database to return the search result. Both Chaudhuri '171 and Lohman teach the step of using indexes to retrieve data from the database without user interaction as claimed.

Conclusion

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the Claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

The prior art made of record, listed on form PTO-892, and not relied upon, if any, is considered pertinent to applicant's disclosure.

If a reference indicated as being mailed on PTO-FORM 892 has not been enclosed in this action, please contact Lisa Craney whose telephone number is **(571) 272-3574** for faster service.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh B. Pham whose telephone number is (571) 272-4116. The examiner can normally be reached on Monday through Friday 7:30am to 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hosain Alam can be reached on (571) 272-3978. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Khanh B. Pham
Primary Examiner
Art Unit 2166

April 25, 2007

